Making platforms interoperable through the EFPF Data Spine

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Why Data Spine?

Service1 -> Data Formats -> Service2

Protocols <-> Data Models

Identity Providers

Service Provider <-> Data

Service Consumer
Why Data Spine?

Data Spine

Protocols

Data Formats

Data Models

Service Provider

Identity Providers

Service Consumer

Data

Service1

Service2
What is the Data Spine?

- It is an Integration and Communications Layer.

- Its main purpose is to bridge protocol heterogeneity and provide uniform access to services between base platforms and apps/tools.

- It supports routing of data (pub/sub and req/resp) and transformation of data models.

- It provides security and identity & access management (e.g. SSO) facilities.
EFPF Ecosystem Architecture

Other Platforms
- EFPF Platform
  - Service
- iQluster
  - Service

Embedded Pilots and Experiments
- Pilots
  - Service
- Open Call Experiments
  - Service

API Security Gateway

Data Spine
- Protocol Connector
- Protocol Connector
- Integration Flow Engine
  - Integration Flow
  - Protocol Connector
  - Protocol Connector

EFPF Security Portal (EFS)
Service Registry
Message Bus

API Security Gateway

Base Platforms
- Service
  - COMPOSITION
- Service
  - NIMBLE
- Service
  - DIGICOR
- Service
  - vf-OS
Realisation of Interoperable Data Spine
Achieving Data Model Interoperability

- One-to-one translation approach used:
  - Each custom data model is translated to a standard data model (e.g. OPC-UA, UBL, OGC SensorThings) using one of the data model transformation tools.
  - In case one data model changes, just one transformation tool has to be changed (w.r.t. one-to-many translation approach)

- Tools considered for transforming the data models:
  - NiFi processors [Jolt, ExcScript, XSLT, ...]
  - Ad-hoc microservices
**EFPF Security Components**

- **API Security Gateway**
  - Policy Enforcement Point

- **EFPF Security Portal (EFS)**
  - SSO
  - User & Policy Management
  - Token Translation Service
  - Policy Enforcement Service
Integration Flow Engine (NiFi)
Data Spine Components’ Interaction

- Apache NiFi
- APISIX
- EFS
- Keycloak
- RabbitMQ
- Linksmart Service Catalog (SC)
- Policy Enforcement Service
- Service Provider
- Service Consumer
- SC REST API Proxy
- RabbitMQ HTTP API Proxy
- EP1-a: Interoperability Proxy of EP1-a
- EP1-c: Proxy of EP1-b

Service provider provides service S1 through Data Spine
Service consumer S2 consumes service S1 through Data Spine
GUI access protected by
Management Interface
REST API
HTTP API
PubSub API
Example: Predictive Maintenance
Data Spine

Why Data Spine?

Figure 1: High-level Dataflow through Data Spine

The EFPF ecosystem is based on a federation model. The services belonging to different platforms are heterogeneous and interoperability gaps exist between them at the levels of protocols, data models, data formats, data semantics, and
Thank you!

Any questions?

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